

A new oak-feeding species of *Lachnus* Burmeister and some remarks on the taxonomic status of *L. chosoni* Szelegiewicz (Hemiptera, Aphididae, Lachninae)

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Abstract

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Key Words

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A new species, *Lachnus pseudonudus* Kanturski & Wieczorek, sp. n., associated with *Quercus ithaburensis* subsp. *macrolepis* is described and figured in detail from specimens collected in Turkey. The lectotype and paralectotypes of *L. crassicornis*, a species associated with *Quercus ithaburensis* subsp. *ithaburensis*, are designated. The taxonomic position of *L. chosoni*, a poorly known species from Korea previously treated as a synonym of *L. pallipes*, is discussed. Morphological and biometric characters of the studied species are given. An identification key to species belonging to the “*pallipes*” group is provided.

Introduction

The genus *Lachnus* Burmeister, 1835 comprises about 20 species associated with deciduous trees from the genera *Castanea*, *Castanopsis*, *Fagus*, *Quercus* (Fagaceae), *Hippophae* (Elaeagnaceae), *Salix* (Salicaceae), *Ficus* (Moraceae) and *Casuarina* (Casuarinaceae) and living on the bark of tree trunks, branches or main roots (Heie 1995; Binazzi and Remaudière 2010). Aphids from this genus are characterised by medium to large body size, long hind legs and pigmented wings in alatae. Key morphological features of *Lachnus* include also the terminal process of the antenna with 2–7 subapical setae, and primary rhinaria with a sclerotic rosette. The apical segment of the rostrum is short and with a button-shaped apical part (Szelegiewicz 1978; Blackman and Eastop 1994). Among representatives of the genus *Lachnus*, most species are

Fagaceae-feeders, associated mostly with oaks (*Quercus* spp.). According to Binazzi and Remaudière (2010), this group of species living on the Fagaceae can be divided into subgroups with or without distinct mesosternal tubercles in apterous viviparous females. The group lacking these tubercles comprises *L. crassicornis* Hille Ris Lambers, 1948, *L. longirostris* (Mordvilko, 1901) and *L. pallipes* (Hartig, 1841) (the “*pallipes*” group) and is characterised also by very long setae on the apical part of the hind tibiae in addition to the normal ones. Among the above mentioned species the status of *L. longirostris* is questionable; i.e. this species is treated as a synonym of *L. pallipes* (Szelegiewicz 1975; Blackman and Eastop 1994), which has been confirmed by recent molecular studies (Mróz et al. 2013). Moreover, the species *L. chosoni* Szelegiewicz, 1975 seems to be closely related to this group, also treated by some authors as a synonym of

L. pallipes (Blackman and Eastop 1994, 2014; Remaudière and Remaudière 1997). In addition, Blackman and Eastop (1994, 2014) suggested that in the collection of the Natural History Museum, London, UK (BMNH) specimens determined as *L. crassicornis* but most probably belonging to an undescribed species related to the “*pallipes*” group are present.

The aim of this paper is to define the taxonomic status of the species belonging to the “*pallipes*” group. On the basis of the material deposited in the BMNH a new, hitherto unknown species is described. The lectotype and paralectotypes of *L. crassicornis* are designated. Based on a reinvestigation of the type material of *L. chosoni* deposited in the Zoological Institute, Polish Academy of Sciences, Warsaw, Poland (ZMPA) the status of this species is discussed. An identification key to species belonging to the “*pallipes*” group is provided.

Material and methods

Material examined.

***L. chosoni*.** Holotype: one apterous viviparous female, KOREA, Myohyang-san Mts. 05.VIII.1959, *Quercus* sp., no APH-4704 B. Pisarski & J. Prószyński leg. ZMPA. Paratypes. Same locality as holotype: two apterous viviparous females, no APH-4705, ZMPA.

***L. crassicornis*.** Lectotype: one apterous viviparous female marked as 1, ISRAEL, Daphne, 28.IV.1945, *Quercus ithaburensis* (Univ. Jerusalem), no BM 1984-340a (present designation) BMNH. Paralectotypes. Same locality as lectotype: three apterous viviparous females marked as 2, 3, 4, no BM 1984-340a; four apterous viviparous females marked as 1, 2, 3, 4 no BM 1984-340b (present designation) BMNH.

***L. pallipes*.** Three apterous viviparous females POLAND, Międzyzdroje, 10.VIII.1965, *Fagus sylvatica*, no R 2316, 2718, H. Szelegiewicz leg. (ZMPA), seven apterous viviparous females, POLAND, Borne Sulinowo, 26.VI.2012, *Q. robur*, no Ł56, Ł. Depa leg., four apterous viviparous females, SLOVAKIA, Palcmanska Masa, 02.VIII.2012, *F. sylvatica*, no L470, Ł. Depa leg. Department of Zoology, University of Silesia, Poland (UŚ).

The specimens were examined using the light microscope Nikon Ni-U. Drawings were made with a camera lucida. Measurements are given in mm (Table 1 and 2). Measurements and ratios of the first segment of hind tarsus (HT I) were made according to Szelegiewicz (1978) and Heie (1995).

The holotype and paratypes of the new species are deposited in the Natural History Museum London, UK, (BMNH). Paratypes will be also deposited in the aphids collection of the Department of Zoology, University of Silesia, Poland (UŚ).

Results

Lachnus pseudonudus Kanturski & Wieczorek, sp. n.

<http://zoobank.org/4C5ABFBE-C6DB-4440-B08E-42CF496472BB>

http://species-id.net/wiki/Lachnus_pseudonudus

Figures 1, 2, 3; Table 1, 2

Description. Apterous viviparous female. Colour in life unknown. Pigmentation of mounted specimens: head, pronotum and mesonotum sclerotised, covered by light brown sclerotic shield. Antennal segments light brown. Fore and middle femora light brown, hind femora brown with pale proximal area to about $\frac{1}{4}$ length. Tibiae from proximal part to about $\frac{1}{2}$ length and on distal parts brown, otherwise yellowish (Fig. 3a). Tarsi brown. Abdomen pale. Siphuncular sclerites pale to light brown. Subgenital and anal plate brown. Body large, egg-shaped (Fig. 1). Head densely covered by short, thick and forked setae, shorter than setae on antennal segments. Frons flat. Head width 0.49–0.57 times length of antennae. Antennae 6-segmented (Fig. 2a), 0.44–0.53 times length of body. Ant. segm. III slightly shorter than ant. segm. IV+V+VI, with 0–1 secondary rhinarium. Ant. segm. IV slightly shorter than, or as well as long as ant. segm. V, with 0–3 secondary rhinaria. Ant. segm. V always longer than ant. segm. VI with 1 primary and 1–2 accessory

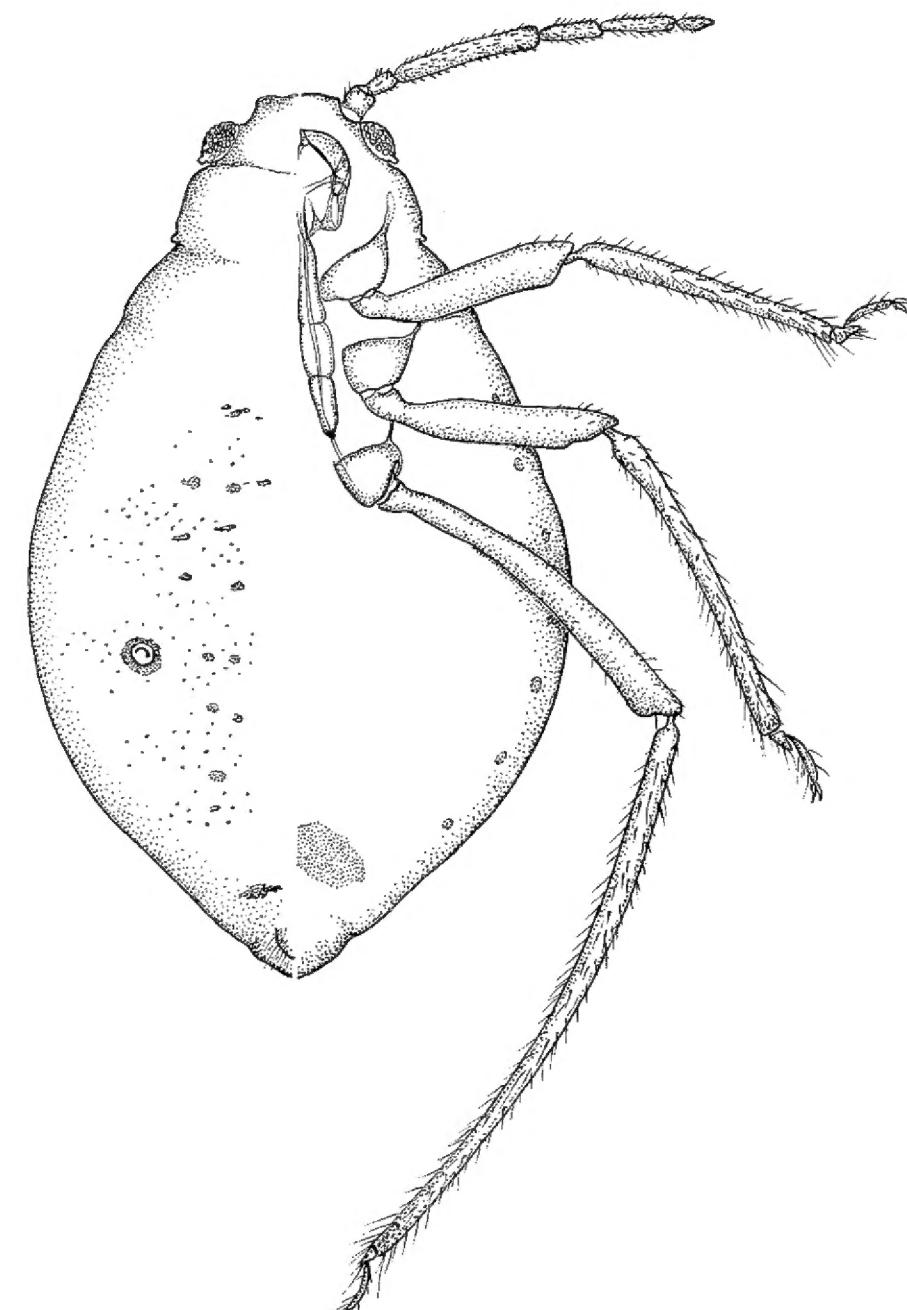


Figure 1. *Lachnus pseudonudus* Kanturski & Wieczorek, sp. n. – apterous viviparous female: general view.

Table 1. Measurements (in mm) of apterous viviparous females (n = 8) *Lachnus pseudonudus* Kanturski & Wieczorek, sp. n. from the type material. Measurements of the holotype bolded.

Character	Apterous viviparous females							
Length of body	3.60	3.20	3.05	3.00	2.62	2.87	2.87	2.95
Maximal width of body	2.25	1.77	1.65	1.52	1.40	1.50	1.55	1.55
Head width across compound eyes	0.81	0.75	0.76	0.74	0.72	0.73	0.73	0.72
Length of antennae	1.60	1.51	1.52	1.36	1.35	1.40	1.43	1.33
Length of antennal segment III	0.64	0.60	0.58	0.53	0.50	0.54	0.51	0.56
segment IV	0.27	0.26	0.27	0.22	0.22	0.25	0.21	0.24
segment V	0.31	0.27	0.30	0.25	0.27	0.26	0.25	0.26
segment VIa	0.13	0.11	0.12	0.11	0.12	0.11	0.11	0.12
segment VIb	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Length of rostrum	1.50	1.60	1.60	1.65	1.50	1.62	1.80	1.90
Length of apical segment of rostrum	0.25	0.25	0.24	0.26	0.26	0.25	0.24	0.25
Length of hind femora	1.35	1.30	1.35	1.25	1.15	1.20	1.15	1.25
Length of hind tibiae	2.55	2.47	2.50	2.30	2.17	2.27	2.20	2.37
Length of hind tarsi segm. I	0.11	0.12	0.11	0.11	0.10	0.12	0.11	0.12
Length of hind tarsi segm. II	0.23	0.23	0.23	0.22	0.22	0.22	0.23	0.22
Siphuncular sclerite diameter	0.18	0.21	0.18	0.18	0.19	0.20	0.22	0.18
Siphuncular cone diameter	0.10	0.10	0.10	0.09	0.11	0.10	0.09	0.10
Subgenital plate length	0.29	0.28	0.26	0.25	0.24	0.26	0.26	0.27
Subgenital plate width	0.53	0.50	0.52	0.47	0.45	0.46	0.42	0.48

Table 2. The main morphological and biometric differences among *Lachnus crassicornis* and *L. pseudonudus* Kanturski & Wieczorek, sp. n. **BL**-body length, **HLL**-hind leg length, **AL**-antennae length, **ANT VI**-antennal segment VI length, **ANT III**-antennal segment III length, **HT I**-first segment of hind tarsus length, **HT II**-second segment of hind tarsus length.

Character	<i>Lachnus crassicornis</i>	<i>Lachnus pseudonudus</i> Kanturski & Wieczorek, sp. n.
Dorsal chaetotaxy	Thorax and abdomen very densely covered by very thin, fine and pointed setae, 0.037–0.050 mm long	Thorax and abdomen covered by very short, inconspicuous setae, arranged in 3–4 rows on each segment with blunt, capitate, spatulate or club-shaped apices, 0.010–0.020 mm long
Head setae	As long as setae on antennae, fine with pointed apices	Shorter than setae on antennae, slightly thick and forked
Antennae	Antennal segments swollen	Antennal segments not swollen
Siphunculi	Siphuncular sclerites very low, siphunculi almost poriform, with little-developed flange with 2–3 rows of polygonal reticulation	Siphuncular sclerites well-developed, with very well-developed flange with 8–10 rows of polygonal reticulation
Abdominal cuticle	Smooth	Wrinkled or reticulated
Hind tibiae chaetotaxy	Some setae on distal part of tibiae 3–4 times longer than other setae, 0.14–0.15 mm long	Some setae on distal part of tibiae 4–5 times longer than other setae, 0.17–0.22 mm long
HT I setae	12	14
HLL/BL	1.47–1.68	1.18–1.45
AL/BL	0.57–0.64	0.44–0.53
ANT VI/ANT III	0.19–0.25	0.25–0.31
HT II/ANT III	0.27–0.36	0.36–0.45

rhinaria. Ant. segm. VI base (IVa) longer than terminal process (IVb), with 1 big primary rhinarium with sclerotised rosette and 6–7 small accessory rhinaria, adjoining each other (Fig. 2b). IVb 0.24–0.33 times length of VIa with 3 apical and 5–7 subapical setae, which are shorter and slightly thicker than basal setae. Other antennal ratios: VI:III 0.25–0.31; V:III 0.44–0.54; IV:III 0.37–0.48; IV:V 0.80–1.03. Ant. segm. I–VIa densely covered with very thin, hair-like, pointed setae. Longest seta on ant. segm. III 1.10–1.66 times basal articular diameter of this segment. Rostrum long, reaching siphunculi or genital plate (in some specimens reaching only hind coxae). Apical segment of rostrum (ARS) pointed, 0.38–0.50 times ant. segm. III and 1.00–1.19 times second segment of

hind tarsus (HT II), with 4 primary and 18 accessory setae (Fig. 2c). Mesosternal tubercles absent. Hind legs long, 1.18–1.45 times length of body. Some setae on hind tibiae 4–5 times longer than other setae, hair-like, 0.17–0.22 mm long (Figs 2d, 3a). First segment of hind tarsus (HT I) with 14 ventral setae (Fig. 2d). HT II 0.36–0.45 times ant. segm. III and 1.37–1.50 times ant. segm. VI. Abdomen membranous, cuticle with very densely wrinkled surface in transverse rows. Siphuncular sclerites well-developed, usually slightly oval, around pore a very well-developed flange with 8–10 rows of polygonal reticulation (Figs 2e, 3e). Dorsal abdominal segments covered with 3–4 rows of very short, blunt, capitate, spatulate or club-shaped setae, 0.010–0.020 mm long, arising from dark brown ring-like

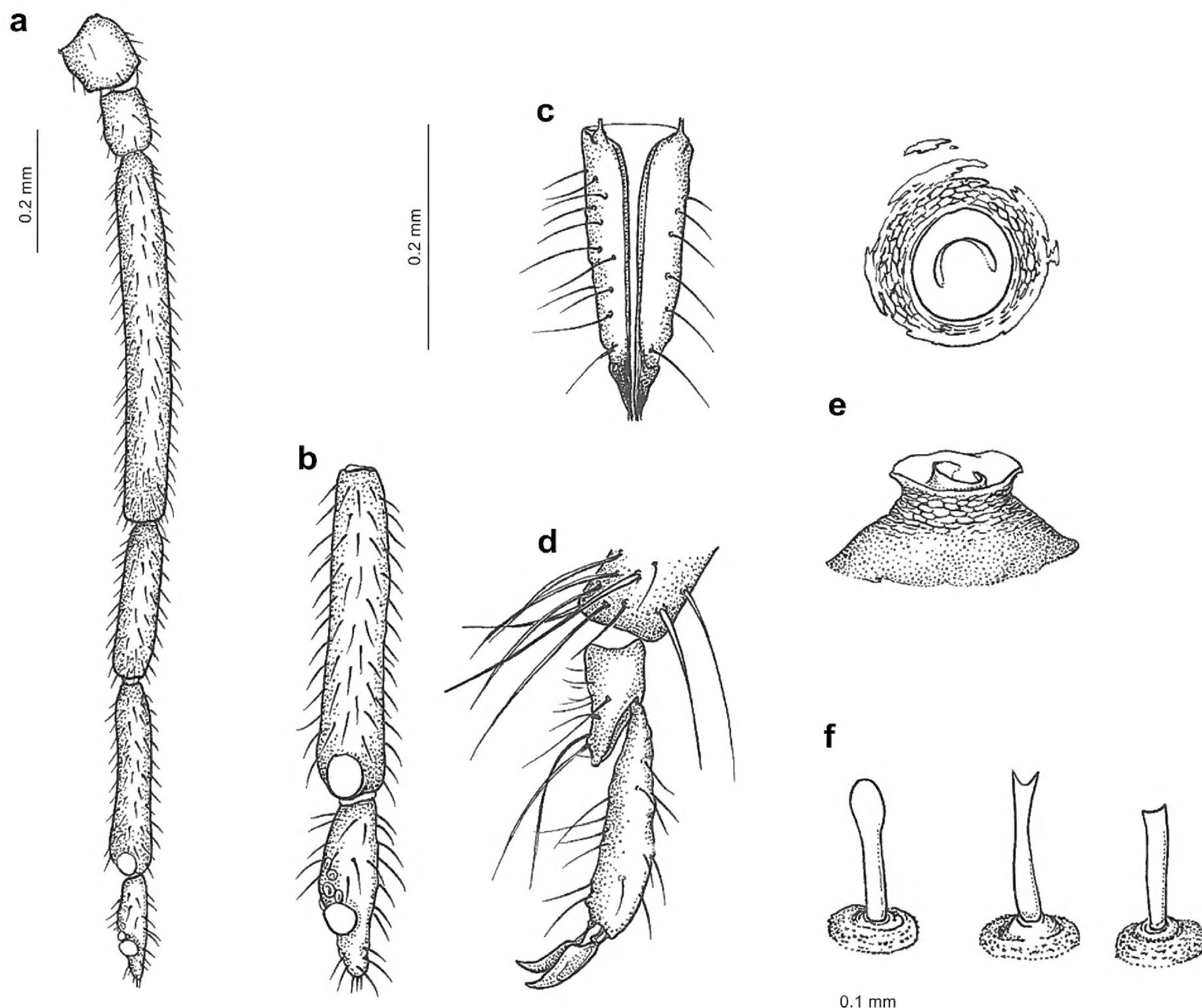


Figure 2. *Lachnus pseudonudus* Kanturski & Wieczorek, sp. n. – apterous viviparous female: (a) antenna, (b) antennal segment V and VI, (c) apical segment of rostrum, (d) distal part of hind tibia and tarsus, (e) siphunculus, (f) dorsal abdominal setae.

bases (Fig. 2f). Each abdominal segment with 3 pairs of brown, rounded sclerites. Subgenital plate well-developed, with indentation from posterior side. Cauda circular or semicircular with 22–24 long and pointed setae which are longer and thicker than those on legs. Anal plate well-developed, sclerotised.

Diagnosis. The new species can be distinguished from *L. crassicornis* as well as from the other *Lachnus* species by the sparse dorsal chaetotaxy and extremely short, inconspicuous setae with blunt, slightly spatulate, capitate or club-shaped apices. The new species is also characterised by siphunculi with a very well-developed and almost transparent flange with 8–10 rows of polygonal reticulation. Main morphological and biometric differences between *L. pseudonudus* Kanturski & Wieczorek, sp. n. and *L. crassicornis* are given in Table 2.

Etymology. The name of the new species is derived from characteristically short and inconspicuous setae on the dorsal part of the thorax and the abdomen.

Biology and host plant. The species live on branches and shoots of *Q. ithaburensis* subsp. *macrolepis*

Table 3. The main morphological and biometric differences among *Lachnus chosoni* and *L. pallipes*. **BL**-body length, **HLL**-hind leg length, **ARS**-apical rostrum segment, **HT II**-second segment of hind tarsus, **HT I**-first segment of hind tarsus.

Character	<i>Lachnus chosoni</i>	<i>Lachnus pallipes</i>
ant. segm. VI/ant. segm. III	0.25–0.31	0.21–0.24
ant. segm. V/ant. segm. III	0.34–0.40	0.40–0.41
ant. segm. IV/ant. segm. V	1.00–1.10	0.78–0.96
BL/HLL	0.65–0.68	0.74–0.83
HLL/BL	1.45–1.52	1.19–1.34
ARS/HT II	0.79–0.84	0.96–1.00
ARS/ant. segm. VI	1.00–1.06	1.26–1.38
Siphuncular sclerite diameter	0.24–0.24	0.15–0.20
HT I basal/HT I ventral	0.29–0.33	0.33–0.40
HT I basal/HT I intersegmental	0.50–0.52	0.60–0.66
HT II/ant. segm. III	0.34–0.37	0.30–0.33
Hind tibiae setae length	0.12–0.14	0.15–0.16
Mesosternal tubercles	Present but very small	Absent
Hind tibiae	Uniformly dark brown with paler proximal part	Brown on distal and proximal parts with pale area for about 1/3 of length



Figure 3. Main differences in pigmentation and chaetotaxy of hind tibiae and size of siphuncular sclerites among apterous viviparous females of the “pallipes” group: (a, e) *Lachnus pseudonudus* Kanturski & Wieczorek, sp. n., (b, f) *L. crassicornis*, (c, g) *L. pallipes*, (d, h) *L. chosoni*, (i) small mesosternal tubercles of *L. chosoni*.

(Kotschy) Hedge & Yalt. (= *Q. aegilops*) and is visited by the ant species *Liometopum microcephalum* (Panzer, 1798) (Canakçıoglu 1975).

Distribution. Turkey, Uşak-Eşme.

Material examined. Holotype: one apterous viviparous female marked as 1. TURKEY, Uşak-Eşme, 850 m, 10.VI.1964, no 731/64, 45a1, M. Canakçıoglu leg. BMNH.

Paratypes. Same locality as holotype: one apterous viviparous female marked as 2, no 731/64, 45a1; four apterous viviparous female marked as 1, 2, 3, 4, no 731/64, 45a2 BMHN; four apterous viviparous female marked as 1, 2, 3, 4, no 731/64, 45a3 UŞ.

Other material examined: 22 apterous viviparous females, same locality as holotype: no 731/64, 45a4–45a9 BMHN.

Key to apterous viviparous females of the “*pallipes*” group of the genus *Lachnus*

- 1 Siphunculi almost poriform with almost invisible sclerites (Fig. 3f). Dorsum covered with thin, long, hair-like and pointed setae, which are almost similar to ventral setae..... *Lachnus crassicornis* Hille Ris Lambers
- Siphunculi with well-developed sclerites (Fig. 3e, g, h). Dorsal setae variable but always different from setae on ventral side 2
- 2 Dorsal abdominal setae short and inconspicuous (max 0.02 mm) with blunt, capitate or club-shaped apices, and arising from large, ring-like bases (Fig. 2f) *Lachnus pseudonudus* Kanturski & Wieczorek, sp. n.
- Setae on dorsal side of abdomen always longer than 0.037 mm and pointed, not arising from large, ring-like bases... 3
- 3 Hind tibiae brown on distal and proximal parts with pale area for about 1/3 of length (Fig. 3c). Ant. segm. IV/ant. segm. V 0.78–0.96, ARS/ant. segm. VI 1.26–1.38, ARS/HT II 0.96–1.00..... *Lachnus pallipes* Hartig
- Hind tibiae with distal part uniformly dark brown and proximal part paler (Fig. 3d). Ant. segm. IV/ant. segm. V 1.00–1.10, ARS/ant. segm. VI 1.00–1.06, ARS/HT II 0.79–0.84 *Lachnus chosoni* Szelegiewicz

Discussion

The Fagaceae-feeding species of the genus *Lachnus* form morphologically related groups (Binazzi and Remaudière 2010). The “*pallipes*” group is characterised by the lack of mesosternal tubercles and two types of setae on the hind tibiae: setae as long as or slightly longer than the diameter of the middle part of the tibiae, and some which are distinctly longer. In this group of species *L. pallipes* is characterised by the longest tibial setae situated not only on the posterior part of the tibiae but usually also distributed individually along almost the whole length of the tibiae. In that species, the body is also covered with numerous setae, but contrary to *L. crassicornis* and *L. pseudonudus* Kanturski & Wieczorek, sp. n. the setae of *L. pallipes* are much thicker and with brown pigmentation. On the other hand, the chaetotaxy of the body and the form and shape of the siphunculi clearly distinguish *L. crassicornis* from other *Lachnus* species. All setae of *L. crassicornis* are very thin and hair-like with pointed apices. Only the setae on the posterior parts of tibiae are slightly thicker and much longer than others. The setae on the dorsal part of the abdomen are almost identical with the setae on the ventral side. Probably the long, hair-like and pointed setae on the ventral side of the abdomen and the same host plant were the reasons why the slides of *L. pseudonudus* sp. n. were wrongly determined by Canakçioğlu as *L. crassicornis* and the latter was listed in the aphidofauna of Turkey by the author (Canakçioğlu 1966, 1967, 1975). Dorsal setae of *L. pseudonudus* sp. n. are extremely short and inconspicuous, so they probably were overlooked during the examination of the material. However, the shape of the siphunculi, as well as the very well-developed flange with reticulation and other distinctive morphological and biometric features (see Table 2) give the new species a clear and separate taxonomic position within the genus *Lachnus*. Both *L. crassicornis* and *L. pseudonudus* sp. n. are known from single localities. *L. crassicornis* was recorded only from two localities in Israel, Daphne and Hotshot (Binazzi and Remaudière 2010; the record of this species from *Q. robur* in Romania reported by Holman and Pintera 1981 needs confirmation) whereas *L. pseudonudus* sp. n. is only known

from its type locality in Turkey. The available material confirms the same host plant for both species: *Q. ithaburensis* (Decne). The Tabor oak includes two subspecies – *Q. ithaburensis* subsp. *macrolepis* (Kotschy) Hedge & Yalt. and *Q. ithaburensis* Decne. subsp. *ithaburensis*. These two subspecies of the Tabor oak occur separately in two Mediterranean subregions i.e. *Q. ithaburensis* subsp. *ithaburensis* is known only from Israel and north-western Jordan, whereas *Q. ithaburensis* subsp. *macrolepis* occurs in the western part of Turkey and in an enclaved region eastward to Ankara (Drufour-Dror and Ertas 2004). As the two subspecies of the Tabor oak do not overlap in their occurrence it is argued that *L. crassicornis* is associated with *Q. ithaburensis* subsp. *ithaburensis*, and *L. pseudonudus* sp. n. with *Q. ithaburensis* subsp. *macrolepis*, which additionally corroborates the separateness of those two species.

Similarly, *L. chosoni* is a rare aphid species, which is known only from the type locality in Myohyang-san (Korea) and all material, including the types, comprises three apterous viviparous females. Although Szelegiewicz (1975) provided a detailed description and drawings of this species, its taxonomic position was undermined and it was treated as a synonym of *L. pallipes* (Blackman and Eastop 1994, 2014; Remaudière and Remaudière 1997). On the other hand, Binazzi and Remaudière (2010) gave *L. chosoni* full species status. However, the authors underlined that it was keyed only on the basis of the data from the original Szelegiewicz's description without studying the type material and still there were doubts about the possible synonymy of these species. A comparison of the type material of *L. chosoni* and *L. pallipes* from various localities, biometric ratios of the lengths of antennal segments, the apical segment of the rostrum and the hind tarsus clearly show differences between those species (see Table 3). Moreover, *L. chosoni* is characterised by the larger siphuncular sclerite diameter, different colouration of the hind tibiae and, most conspicuously, very small mesosternal tubercles (Figs 3c, g, i). Species belonging to the “*pallipes*” group, including *L. pseudonudus* sp. n., are characterised by the absence of those structures, unlike the remaining Fagaceae-feeding species of the genus *Lachnus* (especially the *Quercus* spp. habitants,

Özdemir et al. 2005), which have prominent mesosternal tubercles. However, the presence of longer and shorter setae on hind tibiae, which is also a unique character of the “*pallipes*” group, indicates a close relation of *L. chosoni* with this group of species.

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